# ZOOLOGICA

SCIENTIFIC CONTRIBUTIONS OF THE
NEW YORK ZOOLOGICAL SOCIETY

## DEEP SEA FISH OF THE HUDSON GORGE

*Taken at Station 113 of the Arcturus and Station 114 of the Eleventh Expedition of The Department of Tropical Research*

By William Beebe, Sc.D.

AUG 1957
LIBRARY
POFI
FISH & WILDLIFE
SERVICE

VOLUME XII. NUMBER 1

April 30, 1929

PUBLISHED BY THE SOCIETY
AT THE ZOOLOGICAL PARK, NEW YORK

# NEW YORK ZOOLOGICAL SOCIETY

General Office: 101 Park Avenue, New York City

## OFFICERS

*President,* MADISON GRANT;
*Honorary President,* HENRY FAIRFIELD OSBORN;
*Vice-Presidents,* FRANK K. STURGIS; AND HENRY D. WHITON;
*Chairman, Executive Committee,* MADISON GRANT;
*Treasurer,* CORNELIUS R. AGNEW;
*Secretary,* WILLIAM WHITE NILES.

## BOARD OF MANAGERS

CLASS OF 1930

MADISON GRANT, WM. WHITE NILES, FRANK K. STURGIS, OGDEN MILLS, LEWIS R. MORRIS, ARCHER M. HUNTINGTON, GEORGE D. PRATT, T. COLEMAN DU PONT, HENRY D. WHITON, CORNELIUS R. AGNEW, HARRISON WILLIAMS, MARSHALL FIELD

CLASS OF 1931

PERCY R. PYNE, GEORGE BIRD GRINNELL, ANTHONY R. KUSER, MORTIMER L. SCHIFF, FREDERICK C. WALCOTT, GEORGE C. CLARK, JR., W. REDMOND CROSS, GEORGE GORDON BATTLE, HENRY FAIRFIELD OSBORN, JR., BAYARD DOMINICK, ANSON W. HARD, ROBERT GORDON MCKAY

CLASS OF 1932

HENRY FAIRFIELD OSBORN, GEORGE F. BAKER, ROBERT S. BREWSTER, EDWARD S. HARKNESS, EDWIN THORNE, IRVING K. TAYLOR, HARRY PAYNE BINGHAM, LANDON K. THORNE, J. WATSON WEBB, OLIVER D. FILLEY, DE FOREST GRANT, H. DE B. PARSONS

## SCIENTIFIC STAFF

W. REID BLAIR, *Director of the Zoological Park;*
WILLIAM T. HORNADAY, *Director Emeritus;*
CHARLES H. TOWNSEND, *Director of the Aquarium;*
C. M. BREDER, JR., *Research Associate, Aquarium;*
RAYMOND L. DITMARS, *Curator of Mammals and Reptiles;*
WILLIAM BEEBE, *Honorary Curator of Birds and Director of Department of Tropical Research;*
LEE S. CRANDALL, *Curator of Birds;*
H. C. RAVEN, *Prosector;*
CHARLES V. NOBACK, *Veterinarian;*
ELWIN R. SANBORN, *Editor.*

## EDITORIAL COMMITTEE

MADISON GRANT, *Chairman;*

W. REID BLAIR
WILLIAM BEEBE

CHARLES H. TOWNSEND
GEORGE BIRD GRINNELL

ELWIN R. SANBORN, *Secretary.*

Digitized by the Internet Archive
in 2025

https://archive.org/details/zoologica-nyzs_1929_12_1

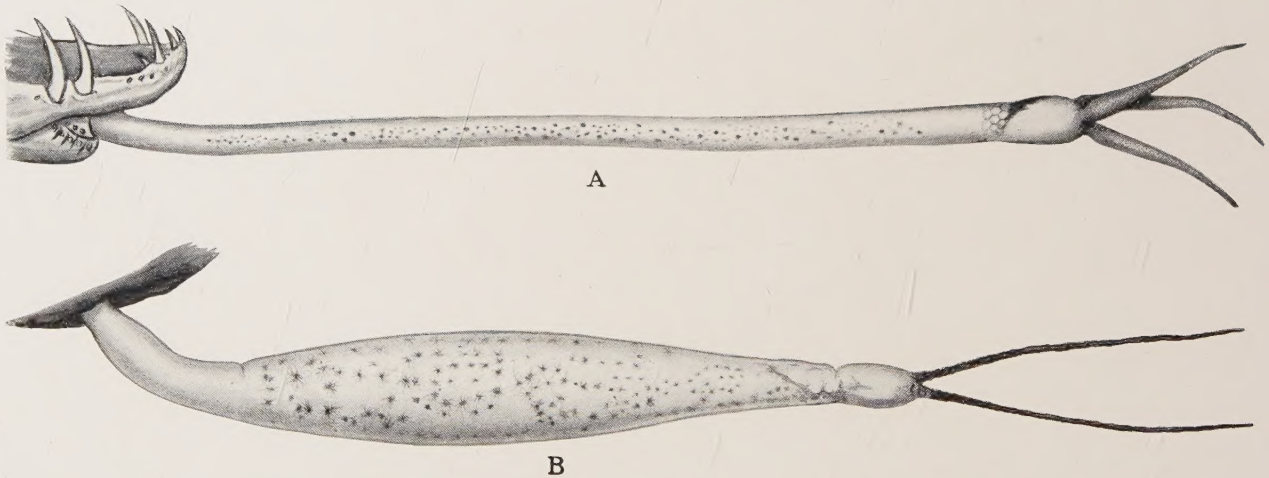


Fig. 1. A—Mental barbel *Stomias boa*. B—Mental barbel STOMIAS FUSUS, sp. nov.

*Zoologica, Vol. XII, No. 1*

# DEEP SEA FISH OF THE HUDSON GORGE*

*Taken at Station 113 of the Arcturus and Station 114 of the Eleventh Expedition of the Department of Tropical Research of the New York Zoological Society*

By William Beebe, Sc.D.

## *INTRODUCTION*

(Fig. 1)

It has always been my desire to see how close to New York City the life of the deep sea is to be found—to see within what narrow limits on the earth one could find such intensive civilization and such an absolutely unexplored field. I interested Mr. L. F. V. Drake and through his influence as President of the Salvage Process Corporation I obtained the use on two separate occasions of the powerful sea-going tug *Wheeler*. I put on board the smaller of my two Arcturus winches with its three miles of quarter inch steel wire.

Two trips were made, on July 8 and August 5, 1928. We left Brooklyn at 6:30 Saturday night and at 8 o'clock the next morning reached the vertical of a mile depth in the Hudson Gorge. This was, as close as we could make it, one hundred and twenty-five miles southeast of the Battery, in 39° 15′ No. Lat. and 72° West Long. This I have called Station 114, or the Hudson Gorge Station, being identical in position with Station 113, the last of the Arcturus Stations, where three years before I spent July 25th to 29th, making sixty hauls with various nets and trawls. Fifty-five species of deep sea fish were taken in all, of which five prove to be new.

In my summary of the results I have combined the organisms taken in Stations 113 and 114. In *Zoologica, Vol. VIII, No. 1,* pp. 22-23, I have given the data of Station 113.

The following table supplies that for Station 114:

*Contribution, New York Zoological Society, Department of Tropical Research, No. 309.

# ELEVENTH EXPEDITION

## DEPARTMENT OF TROPICAL RESEARCH

*Station 114, Hudson Gorge, 125 miles S. E. of New York City, 39° 15′ N. Lat. 72° W. Long.*

*S. S. Wheeler*

| Haul | Metre Net | Date | Time | Duration of Haul | Depth Fathoms |
|---|---|---|---|---|---|
| T1 | ½ | July 8 | 8.26 A. M. | 15 Min. | 100 |
| T2 | ½ | 8 | 9.50 | 2 Hours | 200 |
| T3 | ½ | 8 | 9.50 | 2 | 300 |
| T4 | 1 | 8 | 9.50 | 2 | 400 |
| T5 | ½ | 3 | 9.50 | 2 | 500 |
| T6 | 1 | 8 | 9.50 | 2 | 600 |
| T7 | 1 | 8 | 9.50 | 2 | 700 |
| T8 | ½ | 8 | 1.50 P. M. | 2 | 0 |
| T9 | ½ | 8 | 2.10 | 2 | 650 |
| T10 | 1 | 8 | 2.10 | 2 | 700 |
| T11 | 1 | 8 | 2.10 | 2 | 750 |
| T12 | 1 | 8 | 2.10 | 2 | 800 |
| T13 | 1 | Aug. 5 | 9.30 A. M. | 2 | 500 |
| T14 | 1 | 5 | 9.30 | 2 | 600 |
| T15 | 1 | 5 | 9.30 | 2 | 700 |
| T16 | 2 | 5 | 9.30 | 2 | 800 |
| T17 | 1 | 5 | 1.40 P. M. | 3 | 600 |
| T18 | 1 | 5 | 1.40 | 3 | 700 |
| T19 | 1 | 5 | 1.40 | 3 | 800 |
| T20 | 1 | 5 | 9.15 | 15 | 0 |

# LIST OF DEEP SEA FISH FROM STATIONS 113 AND 114

Superorder *TELEOSTEI*

Order *ISOSPONDYLI*

Family ALEPOCEPHALIDAE
BATHYTROCTES DRAKEI sp. nov. . . . . 6

Family STOMIATIDAE
*Stomias boa* (Risso) . . . . . 6
STOMIAS FUSUS sp. nov. . . . . 7
*Stomias valdiviae* Brauer . . . . . 8
*Stomias colubrinus* Garman . . . . . 8

Family ASTRONESTHIDAE
*Astronesthes martensi* Klunzinger . . . . . 9

Family STYLOPHTHALMIDAE
*Stylophthalmus paradoxus* Brauer . . . . . 9

Family CHAULIODONTIDAE
*Chauliodus sloanei* Bloch and Schneider . . . . . 10
*Chauliodus dentatus* Garman . . . . . 12

Family GONOSTOMIDAE
*Cyclothone signata signata* Garman . . . . . 13
*Cyclothone signata alba* Brauer . . . . . 13
*Cyclothone microdon* Günther . . . . . 13
*Cyclothone acclinidens* Garman . . . . . 13

Family IDIACANTHIDAE
*Idiacanthus fasciola* Peters . . . . . 13

Family MAUROLICIDAE
*Vinciguerria lucetia* (Garman) . . . . . 13

Family STERNOPTYCHIDAE
*Argyropelecus olfersi* Cuvier ..... 14
*Argyropelecus hemigymnus* Cocco ..... 14
*Sternoptyx diaphana* Hermann ..... 14

Order *APODES*
Family DERICHTHYIDAE
DERICHTHYS sp. nov. ..... 14

Family NEMICHTHYIDAE
*Nemichthys scolopaceus* Richardson ..... 14
*Serrivomer beani* Gill and Ryder ..... 15

Order *INIOMI*
Family MYCTOPHIDAE
*Myctophum valdiviae* Brauer ..... 15
*Myctophum glaciale* Reinhardt ..... 15
*Myctophum laternatum* Garman ..... 15
*Myctophum fibulatum* Gilbert and Cramer ..... 15
*Myctophum coccoi* Cocco ..... 15
*Myctophum affine* Lutken ..... 15
*Myctophum punctatum* Rafinesque ..... 15
*Myctophum benoiti* Cocco ..... 15
*Myctophum reinhardti* Lütken ..... 16
*Myctophum hygomi* Lütken ..... 16
*Lampanyctus maderense* Lowe ..... 16
*Lampanyctus warmingi* Lütken ..... 16
*Lampanyctus gaussi* Brauer ..... 16
*Lampanyctus tenuiforme* Brauer ..... 16
*Lampanyctus micropterus* Brauer ..... 16
*Lampanyctus gemmifer* Goode and Bean ..... 16
*Lampanyctus pusillus* Johnson ..... 16
*Diaphus dumerili* Bleeker ..... 16
*Diaphus gemellari* Cocco ..... 16
*Lampadena* sp. ..... 16

Family MALACOSTEIDAE
*Malacosteus niger* Ayers ..... 16

Order *ANACANTHINI*

Family BREGMACEROTIDAE

*Bregmaceros atlanticus* Goode and Bean ..... 16

Family GADIDAE

*Urophycis chesteri* Goode and Bean ..... 17

Order *HETEROSOMATA*

Family BOTHIDAE

*Citharichthys arctifrons* Goode ..... 17

Family PLEURONECTIDAE

*Glyptocephalus cynoglossus* (Linnaeus) ..... 17

Order *XENOBERYCES*

Family MELAMPHAIDAE

*Melamphaes mizolepis* Günther ..... 18

*Melamphaes nigrescens* Brauer ..... 18

*Melamphaes suborbitalis* (Gill) ..... 18

Order *CATAPHRACTI*

Family SCORPAENIDAE

*Helicolenus maderensis* Goode and Bean ..... 18

Order *JUGULARES*

Family ZOARCIDAE

*Lycenchelys verrillii* (Goode and Bean) ..... 18

Order *PEDICULATI*

Family MELANOCETIDAE

*Melanocetus niger* Regan ..... 18

Family CAULOPHRYNIDAE

*Caulophryne jordani* Goode and Bean ..... 19

Family ACERATIIDAE

LIPACTIS MEGALOPS sp. nov. ..... 19

HAPLOPHRYNE HUDSONIUS sp. nov. ..... 19

BATHYTROCTES DRAKEI sp. nov.

*One specimen: No. 7690, Hudson Gorge Station 114, T12. 39° 15′ N., 72° 00′ W. July 7, 1928. Taken in meter net, 800 fathoms.*

Although measuring only 29 mm. in standard length, this fish shows well developed generic and specific characters. To the former belong the toothed maxilla, seven branchiostegals, the dorsal fin longer than the anal, and originating distinctly in advance of the latter fin.

It is a young fish but the shortness of the mouth is wholly unlike the young of *B. rostratus,* or the adult of any other member of the genus. In *B. rostratus* of equal length (29 mm.), the maxilla measures 5 mm., while in the present individual it is only *2.7 mm.* in length. The gape in other species, young or adult, reaches at least to the middle of the eye, while here the posterior end of the maxillary barely makes the *anterior rim* of the eye-ball. The anal rays number *fifteen* instead of from seventeen to twenty-two. The premaxillaries are *not* noticeably protruding, and although their teeth are directed forward, they are of *equal size* with those in the maxillaries. There is *no* supra-clavicular process apparent, in this respect approaching *Alepocephalus.* The color is typical of young *Bathytroctes,* black head and belly, and light gray body.

I have named this species in honor of L. F. V. Drake, Esq., through whose generosity the boat was loaned for this oceanographic work off New York City.

Length: 29 mm.
Depth of body: 2.9 (10)
Depth of peduncle: 1.7
Head: 10.2 (2.8)
Eye, horizontal: 3.3 (3)
Eye, vertical: 1.6
Snout: 3.2 (3.2)
Maxillary length: 2.7
Branchiostegals: 7

Pectoral rays: 16
Pectoral rays length: 1.3
Pectoral total length: 2.1
Pelvic rays length: 1.6
Dorsal rays: 18
Anal rays: 15
Dorsal base length: 5.1
Anal base length: 4.3
Dorsal in front of anal: 2.1
Pelvics in front of anal: 1.9

This appears to be the first specimen of *Bathytroctes* taken in the western Atlantic Ocean. The nearest record is *Bathytroctes antillarum* Goode and Bean, from 420 fathoms, one hundred miles south-east of the Mississippi delta.

*Stomias boa* (Risso)

*Six specimens:*

| *No.* | *L'gth.* | *Sta.* | *Haul* | *Depth* | *P-V* | *V-A* | *A-C* | *Stem* | *L'gth. / Depth* | *L'gth. / Head* | *Head / Eye* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *7644* | *27.5* | *114* | *T14* | *600* | *47* | *11* | *17* | *.8* | *11* | *7.2* | *5.5* |
| *7610* | *35* | *114* | *T7* | *700* | *52* | *10* | | *4.7* | *10* | *6.2* | *6.2* |
| *6558a* | *106* | *113* | *T3* | *400* | *46* | *11* | *17* | | | | |
| *6573* | *111* | *113* | *T5* | *500* | *48* | *13* | *18* | | *11* | *9* | |
| *6558b* | *116* | *113* | *T3* | *400* | *49* | *10* | *17* | *12* | *13.6* | *5.5* | *4* |
| *7669* | *125* | *114* | *T17* | *600* | | | | | | | |

These specimens all fall within the range of variation as given by Brauer for this species. The individual of greatest interest is Number 7644, a young, almost larval phase of 27.5 mm. standard length. When brought up from six hundred fathoms it was white with a dense scattering of pigment along the sides. This completely disappeared in the cleared specimen. Most significant is the absolute lack of ossification throughout head and body. Not a trace of scarlet stain is visible in the cleared tissues, although Number 7610, which is less than eight millimeters longer, and was preserved in the same vial and fluid is well on the stage to adult ossification. In the smallest specimen the head is relatively larger than in the adult, and the stem of the illicium much shorter, being only as long (.8 mm) as the bulb itself. In a fully adult fish the latter has increased not at all, while the stem is twenty-six times longer.

The dentition of the small *Stomias* differs only in slight details from that of the adult: Premaxillary with a medium sized fang each side of the symphysis, a second very large tooth at the anterolateral angle of the premaxillary, curving out and down; five additional ones along the sides of which the first and third are the larger. Mandibular dentition shows an anterior tooth each side of the symphysis, then two very large fangs, set widely apart, leaning almost horizontally outward and then up, followed by six more slender teeth. The pair of vomerine teeth is as large as the anterior premaxillary pair.

*Stomias* Number 7610 possesses eighty vertebrae; atlas to vertical of pectoral fin 7, pectoral to ventral 47, ventral to anal fin 8, anal fin to and including urostyle 18 vertebrae.

A comparison of dimensions of my smallest individual with the largest ever taken is significant in showing a surprisingly regular development of the characters:

| | | | | |
|---|---|---|---|---|
| Length | 308 | mm. | 27.5 = 9 | per cent. of the adult |
| Depth | 23 | " | 2.5 = 10 | " " " " " |
| Head | 28 | " | 3.8 = 13.6 | " " " " " |
| Eye | 6.5 | " | .7 = 10.7 | " " " " " |
| Total Illicium | 26 | " | 1.8 = 7 | " " " " " |
| Pectoral length | 25 | " | 2.7 = 10.8 | " " " " " |
| Ventral length | 29 | " | 2.7 = 9.6 | " " " " " |

*Stomias boa* has a wide distribution, having been taken in the Atlantic from the Hebrides to the Cape of Good Hope, and from Greenland to New England. Also in the Mediterranean and the South Pacific.

### Stomias fusus sp. nov.

(Fig. 1)

*One specimen: No. 7667, Hudson Gorge Station 114, T17. 39° 15′ N, 72° 00′ W. August 6th, 1928. Taken in meter net, 600 fathoms.*

This *Stomias* resembles *boa* in photophore count and in general appearance, but is set quite apart by the character of the mental barbel. Instead of having a slender, mobile stem and a large oval bulb with three tentacles, *fusus* has a stiff, spindle-shaped stem, and two tentacles.

Dimensions:

| | |
|---|---|
| Length: 250 mm. | Ventral length: 23 |
| Depth: 20 (12.5) | Ventral rays: 5 |
| Head: 21 (11) | Dorsal rays: 20 |
| Eye: 5.4 (1.3) | Anal rays: 22 |
| Snout: 3.2 | I-P: 11 |
| Dentition | P-V: 47 |
| One-half upper jaw: 5 | V-A: 12 |
| One-half lower jaw: 7 | A-C: 15 |
| Weight: 28 grams | Lateral scales: 73 |
| Pectoral length: 20 | |

The barbel arises from the center of the chin, an elongated spindle, 16 mm. in length, pale golden yellow densely flecked with black chromatophores. The terminal bulb, 1.5 mm. in length is unpigmented, bright true purple, and is separated from the spindle by a narrow black band. The bulb terminates in two elongated filaments, rather thick at the base and tapering to a fine point. They are 5.7 mm. long, wrinkled for their proximal half and jet black. In preservative the barbel has faded to white with a pale pink bulb.

The suborbital light organ is small and oval, and is purple on the lower half and white above. The lateral photophores are violet in life, the ventral ones golden yellow.

### *Stomias valdiviae* Brauer

*One specimen: No. 7613, Station 114, T10, 700 fathoms.*

A single young specimen of only 26 mm. length shows all the typical photophore counts of this species. It is white, with the lines of luminescent spots black.

| | |
|---|---|
| Length: 26 mm. | Dorsal: 17 rays |
| Depth: 2.5 (10.4) | Anal: 20 rays |
| Head: 2.5 (10.4) | P-V: 43 |
| Eye: .4 (6.2) | V-A: 6 |
| Pectoral: 6 rays | A-C: 16 |

*Stomias valdiviae* has been recorded from the Atlantic and Indian Oceans, but the nearest locality to the Hudson Gorge is the Gulf of Guinea off the west coast of Africa.

### *Stomias colubrinus* Garman

*One specimen: No. 6647, Station 113, T4, 450 fathoms.*

A single specimen of this well-marked species came up from 450 fathoms. It is typical in every respect.

| | |
|---|---|
| Length: 118 mm. | Dorsal: 20 |
| Depth: 11.5 (10.2) | Anal: 23 |
| Head: 13 (9) | P-V: 38 |
| Eye: 4.5 (3.9) | V-A: 10 |
| Pectoral length: 12.5 | A-C: 18 |
| Ventral length: 15 | |

*Stomias colubrinus* has been taken off the Pacific coast of Panama, and near the Cape Verde Islands.

### *Astronesthes martensi* Klunzinger

*One specimen: No. 6648, Length 90 mm., Station 113, T34, 500 fathoms.*

In spite of a number of rather marked variations I choose to consider this fish as *martensi* instead of erecting a new name for it. In the major characteristic with which Parr separates two groups of *Astronesthes,* relating to the relative distance from the snout of the origins of the dorsal and the ventrals, this specimen, and others from more distant Arcturus stations, are midway between the two groups,—the percentage being 1/16 in place of 1/25–1/20 and (in *A. martensi*) 1/10–1/8. It has also a smaller eye, (5.9 in the head instead of 4 to 5). These and other differences may be accounted for by age, for Brauer's specimen was only 31 mm. long, and the three of Parr's measured 48 to 50 mm., while the present Hudson Gorge individual is nearly twice this, being 90 mm. standard length. The barbel is in perfect condition, but wholly lacks the "etwa 8 kleine Faden" of Brauer's fish.

| | |
|---|---|
| Length: 90 mm. | Pectoral rays: 8 |
| Depth: 15 (6) | Ventral rays: 7 |
| Head: 22.5 (4) | Dorsal rays: 15 |
| Eye: 3.8 (5.9) | Anal rays: 16 |
| Snout: 5.4 (4) | Lateral O-V: 15 |
| Barbel: 23 (1) | V-A: 19 |
| Snout to dorsal: 46 | Ventral I-P: 9 |
| Snout to ventrals: 40.5 | P-V: 14 |
| Pectoral length: 16 | V-A: 19 |
| Ventral length: 17.3 | A-C: 12 |

The suborbital organ is large and egg-shaped, and so cloaked with black pigment that it points only straight forward. The barbel is entirely white, the bulb elongated and slenderly club-shaped. No filaments are present or trace of their former attachment.

*Astronesthes martensi* has been taken in the Indian Ocean, Red Sea, south of Ceylon, near the Cape Verde islands, and among the Bahamas.

### *Stylophthalmus paradoxus* Brauer

*Two specimens: No. 7697, Station 114, T6, 600 fathoms, No. 7645, Station 114, T14, 600 fathoms.*

The larger specimen, No. 7697, 41 mm. in length, is decidedly immature, the eye-stalks being only one-quarter as long as they are in the adult, but the other characters are quite typical. Among these are the spoon-shaped jaws, the position of the fins and the peculiar intestine.

Description:

Length: 41 mm.
Depth: 1.1 (37)
Head: 4.6 (8.9)
Eye: 1.3 (3.5)
Eye-stalks: 2.5
Snout: 1.8 (2.6)
Jaw: 2.3

Pectoral length: .8
Snout to pectorals: 4.6
Exposed intestine: 1.4
Intestinal exit to caudal: 5
Caudal length: 2.85
Dorsal to intestinal exit: 2.2

Two long rows of small, black photophores extend along close to the ventral surface: above these on the mid-lateral line an alternating row of pigment blotches. The dorsal and lateral surfaces are faintly pigmented.

The immaturity of this individual is distinctly revealed in clearing. The cranium is hardly discernable, but the parasphenoid, jaws, hyomandibular, quadrate, opercles, branchiostegals, and especially the cleithra and supra-cleithra are strongly ossified. The teeth are small, sharp, evenly spaced, twelve in each upper half jaw and eighteen in the lower half. The vertical fin rays are only slightly ossified, but the urostyle, numerous hypurals, and the caudal rays are strongly marked.

The second specimen is only 4.8 mm. in length, but resembles *Stylophthalmus* more than any related genus. The fin rays are barely discernable. It is white with a patch of pigment beneath the heart, a broad band along the sides formed by the dark line of closely spaced light organs; a dense patch dorsal and ventral, near the caudal fin but not touching it. The intestine protrudes .4 mm. The snout is somewhat spoon-shaped, the eye very elliptical, dorso-ventrally, and very short-stalked. Length 4.8 mm. Depth .6; Head 1.2; Eye .4 mm.

This strange little fish has been recorded from the Atlantic, Indian and Antarctic Oceans.

*Chauliodus sloanei* Bloch and Scheider

Six specimens:

| *No.* | *L'gth* | *Sta.* | *Haul* | *Depth* | *L'gth / Depth* | *L'gth / Head* | *Head / Eye* | *P-V* | *V-A* |
|---|---|---|---|---|---|---|---|---|---|
| *7695* | *26* | *114* | *T13* | *500* | *9* | *5.6* | *4.8* | *19* | *26* |
| *7687* | *28* | *114* | *T11* | *700* | *13 3* | *7.5* | *5.3* | *19* | *26* |
| *6630* | *65* | *113* | *T45* | *1200* | *13* | *7.2* | *4.5* | *19* | *25* |
| *7668* | *230* | *114* | *T17* | *600* | *9.2* | *7.4* | *4.3* | *19* | *25* |
| *7636* | *235* | *114* | *T13* | *500* | *8.6* | *7.8* | *5* | *19* | *26* |

No. 7695 is a white, transparent individual, apparently larval, as intensive staining and clearing reveal no trace of ossification. Compared with a full-grown specimen 235 mm. in length, the relative proportions of head and eye, and number of photophores show no differences. The depth in relation to the length is considerably less in the larva, about 13 to 8, while the elongated first dorsal ray is about one-half the relative length that it is in the adult. In this very young individual this ray is directed backward, not forward, and is extremely soft and

pliable, flat and ribbon-like. The second and third dorsal rays are a third longer than the succeeding ones, the extra length being as pliant as the "bait" in *Lophius*. There are no signs of scales, the myomeres numbering sixty.

The relative length of the paired fins is unlike that in the adult. In this larva they are almost equal, whereas in adults the ventrals are about twice as long as the pectorals. In the young the anterior long canine of the lower jaw is one-fourth the entire length of the mandible, while the adult has a fang quite half as long as the jaw. It is remarkable that although the teeth and jaws are long and strong enough to be functional, yet they are as pliable as rubber, and show not a trace of calcification.

Fish No. 7695 is two millimetres shorter than the transparent larva, but is translucent, semi-opaque. When stained and cleared it shows many points of interest.

The unusual relative depth of the body to the length, nine as compared with thirteen in the 28 mm. fish, is explicable when a full-grown *Cyclothone signata signata* becomes visible in the stomach of the young *Chauliodus*. It can be identified with certainty; as to genus from the clearly distinguishable and ossified head bones and dentition, as to species from the lack of dermal pigment, and as to subspecies because of the presence of seven, not six, supra-lateral photophores. The head and fins of the *Cyclothone* are strongly ossified; the head is 4.3 mm. in length, and the total length 15 mm. Of this, the posterior portion is curved around, lying closely pressed to the back. In this curled position the ingested fish occupies a little over half of the full length of *Chauliodus*.

In spite of being less in length than the unossified larva, this young fish is far more advanced in development. The head is well ossified, especially the jaws, teeth, hyomandibular and humeral arches. This is also true of all the fin rays. There is no trace of vertebral calcification except very fine outlines of the first five. The vertebrae of the entire column can, however, be distinguished, and the scale outlines can be made out in favorable light.

There are five teeth in each half jaw, the first and second premaxillary, and the first and third mandibular being much larger than the rest. Each one is accompanied by a small understudy or auxiliary tooth, ossified near the tip, but with the basal three-fourths clear and pliable, so that it can bend back out of the way when food is being seized, thus keeping in perfect shape until needed to replace the loss of its companion. On the premaxillary, between the second, third and fourth teeth are two, small, outwardly pointing, solitary teeth. The inferior half of the maxillary enters the border of the mouth with ten small, oblique denticles. The frontal crest is conspicuous, and honey-combed with three lateral foramina and a longitudinal open tube. Eighteen branchiostegals, short, vertical, and evenly spaced are distinct.

The opercles and preopercles are clearly ossified, and both of them linear, the same being true of the several cleithra. Thirteen pectoral rays are supported on five faint but distinct brachials. There are seven ventral rays and the pelvic girdle is well developed, the pubic bones extending far forward to a length of

3.2 mm., fully half the distance to the pectoral fin. In the dorsal are six rays, the anterior, elongated one soft, still directed posteriorly, and measuring 7.8 mm. This is very close to the relative length of the same organ in the adult, showing the importance of the filament throughout the life of the individual. The anal fin shows twelve rays.

The urostyle is strongly ossified, and is attended by rather faintly indicated hypurals and eight large and strong epurals. There are nineteen rays which properly enter into the functional caudal fin, with eight small superior, and three inferior supplemental basal raylets.

In the two fully adult specimens taken in the Hudson Gorge, one a male, measures 235 mm. in length, while the other, a female, is 230 mm. long. The chief difference of note is in the size of the eyes, those of the female being considerably larger. The weight of the longer specimen is 55 grams, while the shorter female with her full-sized ovaries weighs 62.5 grams. The relative depth to length apparently increases with age, as the table shows, the two largest fish being respectively 9.2 and 8.6, as compared with 13.3 and 13 in smaller individuals.

There are many other ontogenetic points of interest, but I leave these for a more comprehensive monographic treatment than can be permitted in this brief paper.

*Chauliodus sloanei* has been taken from both east and west sides of the Atlantic, in the Pacific from Japan to New Guinea and in the Indian Ocean.

### *Chauliodus dentatus* Garman

*One specimen: No. 6559. Length 68 mm. Station 113, T45, 400 fathoms.*

It is with reluctance that I admit the validity of this species, considering the variation of numbers of photophores in *C. sloanei.* But I have not been able quite to bridge the gap between the two forms, while other supposedly diagnostic characters are of most slight foundation.

Description:

| | |
|---|---|
| Length: 68 mm. | I-P: 10 |
| Depth: 8.6 (8) | P-V: 21 |
| Head: 10 (6.8) | V-A: 29 |
| Eye: 2 (4.5) | A-C: 11 |

The abnormal depth into length of 8 in such a moderate sized *Chauliodus* is accounted for by the great distension of the stomach, the outlines of an ingested fish being clearly visible through the opaque skin.

*Chauliodus dentatus* is known only from the type which came from the Society Islands.

### Genus *CYCLOTHONE*

*Of this genus I took 1355 individuals in seventeen hauls at Station 114.* Careful analysis shows no correlation between the light and dark forms and any

definite zone of distribution. Of the total catch 861 were dark, and 494 (or 36 per cent) were light.

*Cyclothone signata signata; 251 specimens from Station 114.*

*Cyclothone signata alba; 64 specimens from Station 114.*

*Cyclothone microdon; 1025 specimens from Station 114.*

*Cyclothone acclinidens; 15 specimens from Station 114.*

The hundred fathom distribution was as follows:

| | | | | | |
|---|---|---|---|---|---|
| 500 | fathoms | 68% | light | 32% | dark |
| 600 | " | 19% | " | 81% | " |
| 700 | " | 47% | " | 53% | " |
| 800 | " | 23% | " | 77% | " |

No *microdon* was taken within 400 fathoms of the surface, and only a single *signata* above 100 fathoms. At all Arcturus stations where abundant catches of *Cyclothone* were made the proportion has always been about twice as many dark as light forms.

In a 26.5 mm. *Cyclothone signata* the ovaries were fully developed, each 4.5 mm. in length and containing a total of 530 eggs, averaging .4 mm. in diameter. A female *Cyclothone signata alba* of 29 mm. had 4 mm. ovaries containing 764 ova. In a count of several individuals I found that both *signata* and *microdon* averaged thirteen trunk and nineteen caudal vertebrae.

*C. signata* has been taken in the Atlantic, Pacific and Indian Oceans, *alba* in the Atlantic and Indian, *acclinidens* in the Atlantic, Pacific, Indian, and the Antarctic, while *microdon* is recorded from all five oceans.

### *Idiacanthus fasciola* Peters

*One specimen: No. 6649, Station 113, T35, 600 fathoms.*

This is the only member of this family secured on the two trips to the Hudson Gorge. It measured 122 mm. in length. The species has been taken in the Atlantic, Pacific and Indian Oceans.

### *Vinciguerria ucetia* (Garman)

*Two specimens: No. 7611, Station 114, T9, 650 fathoms.*

In several places where I have dredged in distant parts of the oceans this little fish has proved to be abundant, but in the Hudson Gorge I took only two. The length of these was 11.8 and 18.2 mm. and it was surprising to find that in the smaller, the skeleton, even the vertebral column, was very strongly ossified. There were 22 trunk, and 17 to 18 caudal vertebrae. *Vinciguerria* has been collected in the Atlantic, Pacific and Indian Oceans.

*Argyropelecus olfersi* Cuvier

*One specimen: No. 6625b, Station 113, T43, 1000 fathoms.*

Although only 10.7 mm. long, and taken in the same net as *A. hemigymnus,* there is no question of identificaion, the preopercle and abdominal ridge with their characteristic spines being well grown and ossified. The young of this species has, in addition to the strong, downwardly directed spine of the preopercle, a small, outward pointing one which later becomes reduced. In the present individual the anterior thirteen vertebrae are completely ossified, but in the remainder the calcification is confined to the upper and lower portions. This species has been taken in many parts of the Atlantic, as well as in the Pacific and Indian Oceans.

*Argyropelecus hemigymnus* Cocco

*Two specimens: No. 6591, Station 113, T32, 164 fathoms; No. 6625a, Station 113, T43, 1000 fathoms.*

Both individuals are very young, measuring only 10.7 and 13.2 mm. standard length. The species has been found in the Atlantic, Pacific and Indian Oceans.

*Sternoptyx diaphana* Hermann

*Nine specimens: 6603a, Station 113, T37, 800 fathoms; 7614, Station 114, T10, 700 fathoms; 7635, Station 114, T13, 500 fathoms; 7643, Station 114, T14, 600 fathoms; 7648, Station 114, T15, 700 fathoms (2); 7665, Station 114, T17, 600 fathoms (2); 7679, Station 114, T18, 700 fathoms.*

All the specimens were post-larval, or at least not more than half grown. The species has been recorded from the Atlantic, Pacific and Indian Oceans.

Derichthys sp. nov.

*One specimen: No. 7670, Station 114, T17, 600 fathoms. Length 185 mm.*

This specimen appears to belong to this genus, but has greatly elongated, anteriorly directed, tubular nostrils. I reserve final identification until I have had it stained and cleared.

*Nemichthys scolopaceus* Richardson

*One specimen: No. 6569, length 190 mm. Station 113, T4, 450 fathoms.*

This individual agrees fairly well with the common Atlantic species of Snipe-billed Eel. It has 301 vertebrae and 14 branchiostegals.

It is wide spread through the Atlantic Ocean, and has also been recorded from the Pacific north of New Guinea.

*Serrivomer beani* Gill and Ryder

*Two specimens: No. 6568, Length 385 mm. Station 113, T4, 450 fathoms; No. 6611, Length 285 mm. Station 113, T39, 1000 fathoms.*

This pair of Saw-toothed Eels differs from the superficial description of Gill and Ryder in a number of particulars, but the inadequate original description together with the present paucity of material makes it inadvisable to recognize these differences as specific.

The major characters of No. 6568 are as follows:

Standard length 385 mm.

| | |
|---|---|
| Depth: 7 (55) | Snout: 24 (2.5) |
| Head: 60 (6.4) | Dorsal rays: 130 |
| Eye: 3.5 (17) | Anal rays: 116 |

This species has been taken in various parts of the Atlantic, and near Hawaii. If it is considered as identical with *S. sector* the distribution may be extended to the west coast of Sumatra.

## Family MYCTOPHIDAE

*At the Hudson River Gorge Station three hundred and forty-one individual myctophids were taken, of which seventy-two were larvae, or too young to admit of certain identification. The adults were distributed among twenty species, as follows:*

*Myctophum valdiviae* Brauer; *4 specimens;* recorded from Atlantic, Pacific and Indian Oceans.

*Myctophum glaciale* Reinhardt; *124 specimens;* recorded from northern Atlantic and Arctic waters.

*Myctophum laternatum* Garman; *1 specimen;* recorded from Atlantic, Pacific, and Indian Oceans.

*Myctophum fibulatum* Gilbert and Cramer; *1 specimen;* recorded from Atlantic and Pacific Oceans.

*Myctophum coccoi* Cocco; *11 specimens;* recorded from the Mediterranean, Atlantic, Pacific and Indian waters.

*Myctophum affine* Lutken; *4 specimens;* recorded from Atlantic, Pacific and Indian Oceans.

*Myctophum punctatum* Rafinesque; *1 specimen;* recorded from the Mediterranean and Atlantic.

*Myctophum benoiti* Cocco; *7 specimens;* recorded from Mediterranean, Atlantic, and East Indian waters.

*Myctophum reinhardti* Lutken; *4 specimens;* recorded from Atlantic, Pacific and Indian Oceans.

*Myctophum hygomi* Lutken; *3 specimens;* recorded from Mediterranean, Atlantic, and Indian waters.

*Lampanyctus maderense* Lowe; *12 specimens;* recorded from Atlantic and Mediterranean waters.

*Lampanyctus warmingi* Lutken; *3 specimens;* recorded from Atlantic and Indian Oceans.

*Lampanyctus gaussi* Brauer; *73 specimens;* recorded from Atlantic Ocean.

*Lampanyctus tenuiforme* Brauer; *2 specimens;* recorded from the Indian Ocean. When more detailed descriptions are available this may prove to be *Lampanyctus nobilis* Taaning from the north Atlantic.

*Lampanyctus micropterus* Brauer; *1 specimen;* recorded from Atlantic and Indian Oceans.

*Lampanyctus gemmifer* Goode and Bean; *1 specimen;* recorded from Atlantic Ocean.

*Lampanyctus pusillus* Johnson; *11 specimens;* recorded from Atlantic Ocean.

*Diaphus dumerili* Bleeker; *2 specimens;* recorded from Atlantic and East Indian waters.

*Diaphus gemellari* Cocco; *3 specimens;* recorded from Mediterranean, Atlantic, and Indian waters.

*Lampadena* sp.; *1 specimen*, too injured for specific identification.

The larval myctophids averaged fifteen millimetres in length, and showed three pairs of pigment spots on the epidermis, one before each eye, one each at the anterior base of the pectoral and ventral fins. A few photophores were faintly adumbrated, especially four of the postero-anal light organs.

In relative specific abundance there was a decided disparity, since three-fourths of the total number of adult myctophids belonged to two species, *Myctophum glaciale* and *Lampanyctus gaussi.*

### *Malacosteus niger* Ayers

*One specimen: No. 6651, length 80 mm., Station 113, T5, 500 fathoms;* recorded from the Atlantic, Pacific and Indian Oceans.

### *Bregmaceros atlanticus* Goode and Bean

*One specimen: No. 7642, length 21.5 mm., Station 114, T14, 600 fathoms.*

Dorsal elements I-47, anal 57. Color: Creamy white with a thick scattering

of stellate chromatophores over the dorsal part of the head and body, less abundant below. Opercula immaculate. Iris greenish silver.

This species has been taken in various parts of the Atlantic.

### *Urophycis chesteri* Goode and Bean

*2250 specimens collected and counted; about 1000 thrown back without counting.*

*Taken in every net of a twenty-four hour series of half-hour surface hauls. Station 113, T6 to T29, July 25 and 26, 1925.*

These hake were, without exception, larval, post-larval or young up to five inches in length.

Hake are found all along the Atlantic coast of the United States in depths of from one hundred to five hundred fathoms, and are probably the most abundant fish on the edge of the continental shelf.

### *Citharichthys arctifrons* Goode

*Nine specimens: Numbers 6636 and 6637, Station 113, D1, 1000 fathoms.*

Measurement of an average specimen.

| | |
|---|---|
| Length 42 mm. | Mandible: 3 (3.7) |
| Depth: 13 (3.2) | Dorsal: 81 |
| Head: 11.3 (3.7) | Anal: 65 |
| Eye: 3.5 (3.2) | Vertebrae: 36 |

A common species in the deeper waters of the Gulf Stream.

### *Glyptocephalus cynoglossus* (Linnaeus)

*Twenty-one specimens: No. 6560, one, Station 113, T3, 400 fathoms; No. 6638, nineteen, Station 113, PT3, 69 fathoms; No. 6854, one, Station 113, PT3, 69 fathoms.*

All the specimens are young, averaging 40 mm. They are intermediate between *h* and *i* in Fig. 71, p. 175, "Eier und Larven von Fischendes Nordischen Planktons." The eye has just begun its migration. Ours lack the pigment spots on the interneurals and interhaemals.

The eyes and color are on the right side, and there are 58 vertebrae, 108 dorsal and 90 anal rays.

This fluke is found on both coasts of the northern parts of the Atlantic Ocean.

## Genus *MELAMPHAES*

*Three species of this deep sea genus were taken at the Hudson Gorge Station.*

*Melamphaes mizolepis* Gunther

*Three specimens: No. 7682, length 88 mm., Station 114, T19, 800 fathoms; No. 7678, length 43 mm., Station 114, T18, 700 fathoms; No. 7666, length 10 mm., Station 114, T17, 600 fathoms.*

Recorded from the Atlantic, Pacific and Indian Oceans.

*Melamphaes nigrescens* Brauer

*Two specimens: No. 6610, length 41 mm., Station 113, T39, 1000 fathoms; No. 6616, length 3 mm., Station 113, PT1, 1000 fathoms.*

Recorded from the Atlantic and Indian Oceans.

*Melamphaes suborbitalis* (Gill)

*One specimen: No. 6615, length 63 mm., Station 113, PT1, 1000 fathoms.*

Recorded from the Atlantic and Indian Oceans.

*Helicolenus maderensis* Goode and Bean

*One specimen: No. 6575, length 152 mm., Station 113, V1, 546 fathoms.*

In life this fish weighed 128 grams. It was brilliant scarlet with some dark mottling along the back and considerable silver on the under parts. The iris was greenish gold.

Recorded from moderately deep water off the entire coast of the eastern United States, and near the Madeira Islands.

*Lycenchelys verrillii* (Goode and Bean)

*One specimen: No. 6576, length 128 mm., Station 113, D2, 69 fathoms.*

This species has been taken off the north-eastern coast of the United States.

*Melanocetus niger* Regan

*One specimen: No. 6552, Station 113, T35, 600 fathoms.*

| | |
|---|---|
| Length: 15 mm. | Longest tooth: 1.9 |
| Head: 9.1 | Dorsal: 14 rays |
| Mandible: 11.8 | Anal: 4 |
| Interfrontal: 4 | Pectoral: 21 |

Although a young fish, all the major characters are well developed. It is certainly not *M. johnsoni*, and shows no radical differences from *M. niger* although this species is known only from the Pacific.

*Caulophryne jordani* Goode and Bean

*One Specimen: No. 6530, Station 113, T35, 600 fathoms.*
A single specimen of small size is typical in every respect.

LIPACTIS MEGALOPS sp. nov.

*One Specimen: No. 6633a, Station 113, T43, 1000 fathoms.*
Near *L. tumidus* of Regan but with much larger eyes (5.9 in head instead of 8.3), and an external, sessile cephalic bulb. The basal part of the illicium is subdermal but well developed, while the external, flat-topped bulb rests in a groove on the outside of the dermal envelope. The snout is 5.9 in the head instead of 4 as in *tumidus*.

| | |
|---|---|
| Length: 10 mm. | Eye: 1 (5.9) |
| Depth: 7.5 (1.3) | Snout: 1 (5.9) |
| Depth of actual body: 5.9 | Maxillary: 1.6 (3.7) |
| Head (to gills): 5.9 (1.7) | |

Type Location: The type is deposited in the collection of the Department of Tropical Research in the New York Zoological Society.
Name: *megalops*, from the unusually large size of the eyes.

HAPLOPHRYNE HUDSONIUS sp. nov.

*One specimen: No. 7696, Station 114, T6, 600 fathoms.*
For detailed description see the succeeding number of ZOOLOGICA, Volume XII, Number 2.

# New York Zoological Society

## OBJECTS OF THE SOCIETY

A Public Zoological Park. A Public Aquarium. The Preservation of our Native Animals. The Promotion of Zoology.

### ZOOLOGICA VOL. I

| | | Paper | Cloth |
|---|---|---|---|
| Parts 1-20 | *Not bound* | 3.85 | |
| Parts 1-20 | *Bound* | | 6.00 |

### ZOOLOGICA VOL. II

| | | | |
|---|---|---|---|
| Parts 1-18 | *Not bound* | 4.30 | |
| Parts 1-18 | *Bound* | | 6.50 |

*Postage weight, 4 pounds*

### ZOOLOGICA VOL. III

| | | | |
|---|---|---|---|
| Parts 1-23 | *Not bound* | 3.25 | |
| Parts 1-23 | *Bound* | | 5.00 |

### ZOOLOGICA VOL. IV

| | | | |
|---|---|---|---|
| Parts 1-5 | *Not bound* | 2.35 | |
| Parts 1-5 | *Bound* | | 4.00 |

### ZOOLOGICA VOL. V

| | | | |
|---|---|---|---|
| Parts 1-21 | *Not bound* | 1.90 | |
| Parts 1-21 | *Bound* | | 3.50 |

### ZOOLOGICA VOL. VI

| | | | |
|---|---|---|---|
| Parts 1-5 | *Not bound* | 2.95 | |
| Parts 1-5 | *Bound* | | 4.50 |

All other volumes of Zoologica listed are not completed.

### ZOOLOGICA VOL. VII

| | Paper | Cloth |
|---|---|---|
| 1—Three-Toed Sloth (*Beebe*) | .60 | |
| 2—Development of Soldier Termites (*Emerson*) | .25 | |
| 3—A New Polychaetous Annelid (*Treadwell*) | .10 | |
| 4—A River Dolphin from Kartabo (*Williams*) | .30 | |

### ZOOLOGICA VOL. VIII

| | |
|---|---|
| 1—The Arcturus Expedition (*Beebe*) | .50 |
| 2—Arcturus: Equipment and Operation (*Tee-Van*) | .60 |

| | Paper | Cloth |
|---|---|---|
| 3—Brotulid Fishes (*Trotter*) | .20 | |
| 4—Galapagos Brachyura (*Boone*) | 1.40 | |
| 5—Embryology of American Eel (*Fish*) | .30 | |
| 6—Studies on Body-Forms of Fishes (*Gregory*) | .75 | |
| 7—Annotated List of Synentogathi (*Nichols-Breder*) | .45 | |
| 8—Polychaetous Annelids (*Treadwell*) | .30 | |
| 9—Sea Stars from the Arcturus Expedition (*Fisher*) | .15 | |
| 10—Scyphomedusae (*Bigelow*) | .25 | |

## ZOOLOGICA VOL. IX

| | | |
|---|---|---|
| 1—Marine Fishes—New York and So. New England (*Nichols-Breder*) | 1.40 | |
| 2—Inquilinism (*Gudger*) | .15 | |
| 3—Frog Tagging (*Breder-Redmond*) | .30 | |
| 4—Turtle Trailing (*Ruth Breder*) | .25 | |
| 5—Functions and Morphology (*Parr*) | .25 | |
| 6—Uruguayan Fur-Seal Islands (*Smith*) | .25 | |
| 7—Field Observations on Flying Fishes (*Breder*) | | |
| 8—Charles Island Tortoises (*Brown*) | | |
| 9—Color Changes of Fishes (*Townsend*) | | |

## ZOOLOGICA VOL. X

| | | |
|---|---|---|
| 1—The Fishes of Port-au-Prince Bay, Haiti (*Beebe-Tee-Van*) | 1.90 | |

## ZOOLOGICA VOL. XI

| | | |
|---|---|---|
| 1—Haematology of the Camelidae (*Ponder-Yeager-Charipper*) | .15 | |
| 2—Haematology of the Primates (*Ponder-Yeager-Charipper*) | | |

## ZOOLOGICA VOL. XII

| | | |
|---|---|---|
| 1—Deep-sea Fish; Hudson Gorge (*Beebe*) | | |
| 2—Haplophryne hudsonius (*Beebe*) | | |

---

## ZOOPATHOLOGICA VOL. I

| | | |
|---|---|---|
| Parts 1-8 | *Not bound* | 2.05 |

## ZOOPATHOLOGICA VOL. II

| | | |
|---|---|---|
| 1—The Treatment of Fish Diseases (*Mellen*) | | .50 |

A completely classified list of the subjects included in each of the finished volumes of Zoologica, and all other publications of the New York Zoological Society will be furnished on application. Address H. R. Mitchell, Chief Clerk, Zoological Park, 185th St. & Southern Boulevard, New York City.